EQUITY RESEARCH

Capital Markets

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RBC Elements™: Uranium Outlook

Improving trends, but equity values amplified by social media

Our view: We believe uranium market fundamentals have improved with increased support for nuclear as a clean energy and renewed financial interest to invest in physical uranium, which should support a gradual recovery in prices to levels that better reflect production economics. We view the uranium market as balanced through the mid-2020's before entering a more significant deficit in the late-2020's, with prices rising gradually to first incentivize re-starts and then new builds later in the decade. However, we think the improving uranium market trends have been amplified by social media excitement, driving uranium equities ahead of actual fundamentals.

We continue to rate **Cameco** at Underperform and maintain our $17 PT, as higher uranium prices are offset by a stronger CAD in our forecast. We have lowered our rating on **NexGen** to Sector Perform, Speculative Risk, while maintaining our PT at $6, as shares reach full valuation in our view. We also pushed back the Rook I mine start-up to 2027, from 2026, and note potential risks to market prices if the large project were brought online before the market enters a more significant deficit later this decade.

Uranium market outlook improving over time: We continue to view the uranium market as in balance or in a slight deficit through the mid-2020's, as idled supply comes online to meet steadily growing demand. In the late-2020's, we see a larger deficit forming as demand continues to rise with new reactors, primarily in China, and supply decreases due to potential mine closures and less secondary supply. We have increased our 2021-2030 demand forecast by 5%, due to keeping more current reactors online and higher growth estimates in China, but this is offset by a 6% increase in our supply forecast due to increased production from Kazatomprom and the addition of Langer Heinrich to our outlook.

We have raised our uranium price forecast to account for increased financial interest to invest in physical uranium, which may help spot and term market prices rise to better reflect current production economics – our price forecasts for the 2021-2025 period are ~10% higher. We see the potential for market backwardation in 2022, with spot prices reaching $40/lb while term prices only rise to $35/lb, and then settling at $40-45/lb through the mid-2020's to incentivize idled production re-starts. Longer-term we see prices rising to $50/lb to reflect incentive prices required for new mine production.

Equity values ahead of fundamentals as social media interest in uranium up significantly: We believe increased social media attention on uranium may be playing a part in the recent rise in uranium equity valuations and should be taken into consideration by investors evaluating the sector. With the help of our RBC Elements data analytics team, we have tracked social media activity for uranium equities over the past 10 years. Since December 2020, social media activity related to uranium has seen a sharp increase (+230% in monthly mentions), which coincides with the recent run-up in valuations. As uranium market fundamentals have improved only modestly in the past 6-months compared to the sharp rise in equity values, we believe increased social media attention may be contributing to higher valuations. We think there is the potential that ongoing social media activity may keep valuations elevated compared to actual fundamentals, but we caution investors that social media trends can change quickly, while contributors are unregulated and may present biased views that serve their own interests.

Answering the most frequently asked questions: With the rise in uranium equities and increased attention on the sector, investor inbounds on the sector have also increased. In this report, we have compiled our in-depth answers to the most frequently asked questions including - How do current market conditions compare to previous bull markets? Is the uranium market in a deficit? What is the impact from financial interest in physical uranium? What uranium prices are supported by the cost curve and incentive curve? What is the current inventory situation? Do utilities need to sign new contracts?

RBC Elements™
Driving insights through data

See RBC Elements page at the end of this note.

Priced as of prior trading day's market close, EST (unless otherwise noted). All values in USD unless otherwise noted
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Uranium market in balance to slight deficit through mid-2020's

We continue to view the uranium market as in balance or in a slight deficit through the mid-2020s, as idled supply comes online to meet steadily growing demand. In the late-2020s, we see a larger deficit forming as demand continues to rise with new reactors, primarily in China, and supply decreases due to potential mine closures and less secondary supply.

We have raised our uranium price forecast to account for increased financial interest to invest in physical uranium, which may help spot and term market prices rise to better reflect current production economics – our price forecasts for the 2021-2025 period are ~10% higher. We see the potential for market backwardation in 2022, with spot prices reaching $40/lb while term prices only rise to $35/lb, and then settling at $40/lb through the mid-2020s to incentivize idled production re-starts. Longer-term we see prices rising to $50/lb to reflect incentive prices required for new mine production.

Changes to our uranium S&D model include – increased uranium demand from 2021-2030 by 5%, due to keeping the US Byron and Dresden plants online and raising our China demand forecast; increased our 2030-2035 demand forecast by 12%, due to assuming no significant closures in Europe and raising our China demand forecast; increased uranium supply from 2021-2030 by 6%, due to increased production from Kazatomprom and the re-start of Langer Heinrich with higher market prices; increased uranium supply from 2030-2035 by 3%, due to increased production from Kazatomprom.

Exhibit 1 - RBC Uranium market outlook

S&D (Mlbs U3O8)	2015	2016	2017	2018	2019	2020	2021E	2022E	2023E	2024E	2025E	2026E	2027E	2028E	2029E	2030E	CAGR 20-30E	CAGR 20-35E
United States	100	100	100	100	99	97	95	94	95	96	95	94	94	94	94	94	0%	0%
West & Central Europe	120	120	120	118	118	115	113	110	102	104	101	97	100	101	103	103	-1%	-1%
Russia	25	26	27	29	29	29	30	29	30	31	30	29	28	28	27	29	0%	0%
Other East Europe	16	16	16	16	16	16	17	19	19	19	19	19	19	19	19	20	2%	2%
China	23	28	33	34	43	48	49	53	55	55	59	67	79	87	94	101	7%	7%
Japan	1	3	7	9	9	6	8	11	12	14	14	16	18	18	19	20	12%	8%
India	5	5	6	6	6	6	7	7	7	9	9	10	11	11	12	12	6%	5%
Other Asia	26	28	28	28	29	28	29	33	36	34	35	35	35	35	35	36	2%	1%
Other	22	21	21	21	21	22	21	21	20	22	23	23	28	28	29	31	3%	3%
Generating Capacity (GWe)	**338**	**346**	**358**	**362**	**371**	**367**	**370**	**376**	**376**	**384**	**386**	**390**	**410**	**421**	**431**	**445**	**2%**	**2%**
Demand (Mlbs U3O8)	**168**	**164**	**177**	**181**	**180**	**171**	**176**	**173**	**175**	**185**	**197**	**190**	**195**	**198**	**203**	**208**	**2%**	**1%**
Africa	20	19	20	23	22	22	20	21	22	22	23	26	26	26	26	21	0%	-2%
Australia	15	16	14	17	16	16	13	13	13	13	13	14	15	16	16	17	0%	-2%
Canada	34	36	34	18	18	10	7	18	27	36	36	36	36	36	36	18	5%	4%
Kazakhstan	61	64	61	56	59	51	59	59	62	64	64	62	62	62	62	62	2%	1%
Russia	8	8	8	8	8	7	7	7	8	9	9	9	9	9	9	9	2%	1%
Ukraine	3	3	3	2	2	2	2	3	3	3	3	3	3	3	3	3	2%	2%
Uzbekistan	8	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	0%	0%
United States	3	3	3	2	0	0	0	0	0	0	0	0	0	0	0	0	NA	NA
Other	7	7	6	6	6	6	7	7	7	7	8	8	8	8	8	8	2%	1%
Mine Supply (Mlbs U3O8)	**159**	**164**	**157**	**139**	**140**	**123**	**124**	**137**	**150**	**162**	**164**	**167**	**167**	**168**	**169**	**146**	**2%**	**1%**
Russia	14	16	18	16	16	15	15	15	15	15	14	13	12	11	11	8	-6%	-5%
United States	8	6	5	4	3	3	1	1	2	1	2	1	2	2	3	1	-11%	-8%
Other	18	17	17	19	17	16	16	15	12	11	9	9	9	9	8	8	-6%	-5%
Secondary Supply (Mlbs U3O8)	**40**	**39**	**39**	**38**	**36**	**34**	**32**	**31**	**29**	**27**	**25**	**23**	**23**	**21**	**21**	**17**	**-6%**	**-5%**
Mine Supply	159	164	157	139	140	123	124	137	150	162	164	167	167	168	169	146	2%	1%
Secondary Supply	40	39	39	38	36	34	32	31	29	27	25	23	23	21	21	17	-6%	-5%
Total Supply (Mlbs U3O8)	**199**	**203**	**196**	**178**	**177**	**158**	**156**	**168**	**179**	**189**	**190**	**190**	**190**	**189**	**190**	**164**	**0%**	**0%**
Surplus/Deficit	**32**	**39**	**19**	**-3**	**-3**	**-14**	**-20**	**-5**	**5**	**3**	**-7**	**0**	**-5**	**-10**	**-13**	**-44**		
Supply as % of demand	119%	124%	111%	98%	98%	92%	89%	97%	103%	102%	96%	100%	97%	95%	93%	79%		
Spot Price (US$/lb)	**$37**	**$26**	**$22**	**$25**	**$26**	**$29**	**$33**	**$40**	**$40**	**$40**	**$40**	**$40**	**$40**	**$40**	**$40**	**$50**	**5%**	**6%**
Term Price (US$/lb)	**$47**	**$40**	**$31**	**$31**	**$32**	**$32**	**$34**	**$35**	**$40**	**$40**	**$40**	**$40**	**$50**	**$50**	**$50**	**$50**	**5%**	**4%**

Source: UxC, WNA, Company reports, RBC Capital Markets estimates

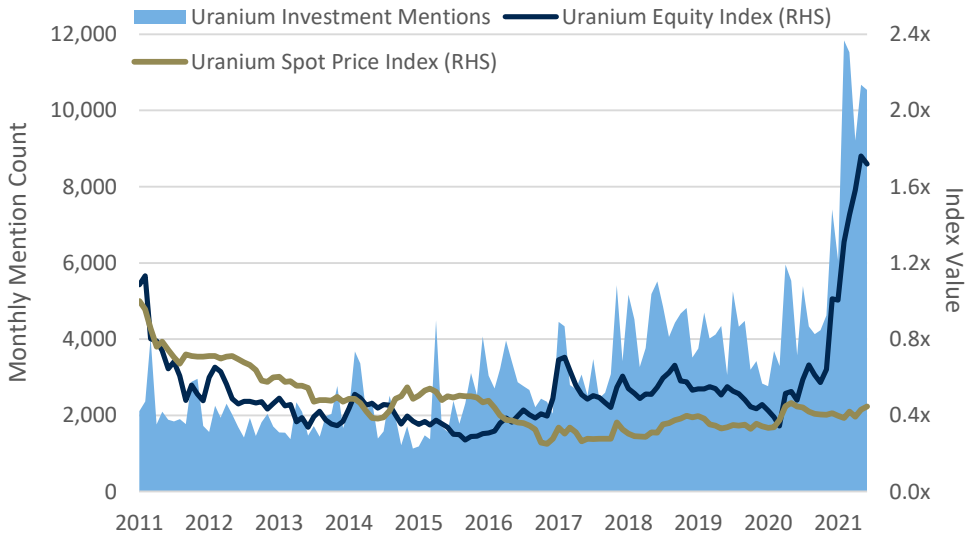
RBC Elements™ – The social media impact on uranium equities

We believe increased social media attention on uranium may be playing a part in the recent rise in uranium equity valuations and should be taken into consideration by investors evaluating the sector. With the help of our RBC Elements data analytics team, we have tracked social media activity for uranium over the past 10 years. Since December 2020, we have noted a sharp increase in social media activity related to uranium equities, which has coincided with the recent run-up in valuations. E

As uranium market fundamentals have improved only modestly in the past 6-months compared to the sharp rise in equity values, we believe the increase in social media attention may have played a part in higher valuations. We think there is the potential that ongoing social media activity may keep valuations elevated compared to actual fundamentals, but we caution investors that social media trends can change quickly, while contributors are unregulated and may present biased views that serve their own interests.

Since December 2020, monthly social media mentions for uranium as an investment have increased by +230% compared to the 3-year monthly average. The rise in social media mentions for uranium coincided with the recent increase in uranium equity valuations that also started in December 2020.

Exhibit 2 - Surge in uranium social media interest coincides with equity run-up

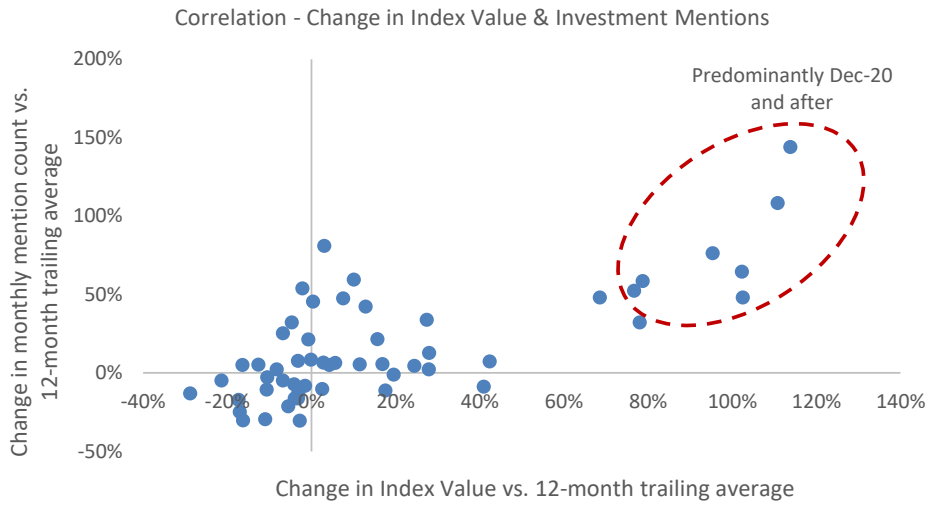


Source: RBC Elements, RBC Capital Markets, Brandwatch

E Learn more about RBC Elements on page 26.

While it is difficult to determine causality, we have seen a significant correlation between social media activity and uranium equity moves over the past four years, with months that feature higher social media mentions for uranium as an investment correlated with higher uranium equity returns.

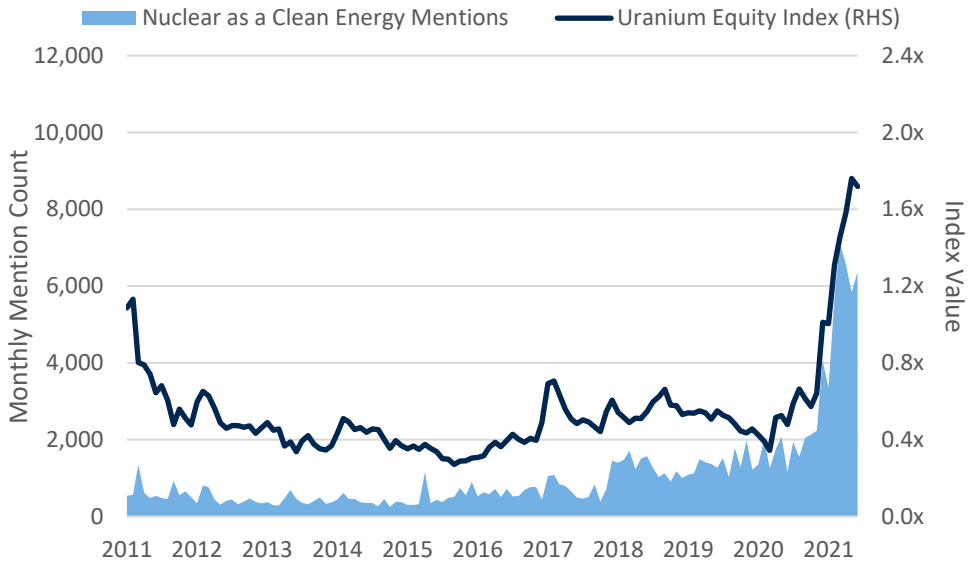
Exhibit 3 - Higher social media activity in uranium correlates with higher equity returns



Source: RBC Elements, RBC Capital Markets, Brandwatch

Social media mentions for nuclear as a clean energy investment have also increased since December 2020, coinciding with the election of President Biden in the US and a broader global focus on de-carbonization in the past 6-months. The increased interest in nuclear as a clean energy may have raised interest in uranium as a derivative investment in nuclear energy.

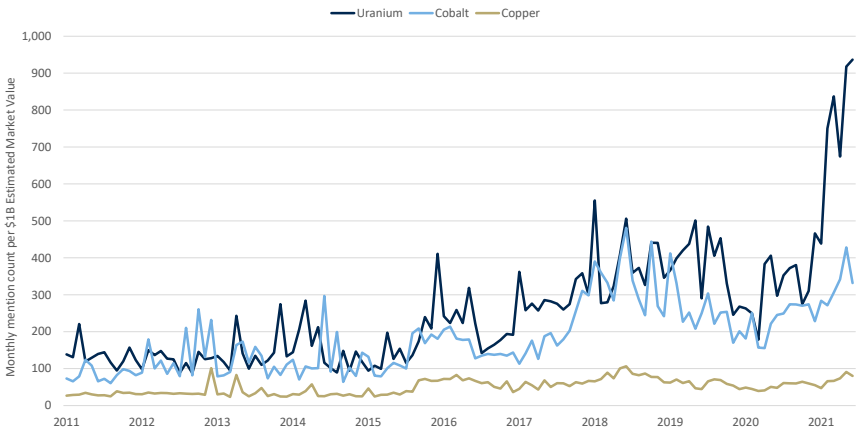
Exhibit 4 - Nuclear as a clean energy has also seen a sharp increase in social media interest



Source: RBC Elements, RBC Capital Markets, Brandwatch

Relative to other commodities, we think it is especially important to consider the social media impact on uranium equities as we have seen more social media activity for uranium compared to other commodities that are also considered critical to the clean energy transition, such as cobalt and copper. On a relative basis, uranium social media activity is 3x higher than cobalt and 15x higher than copper.

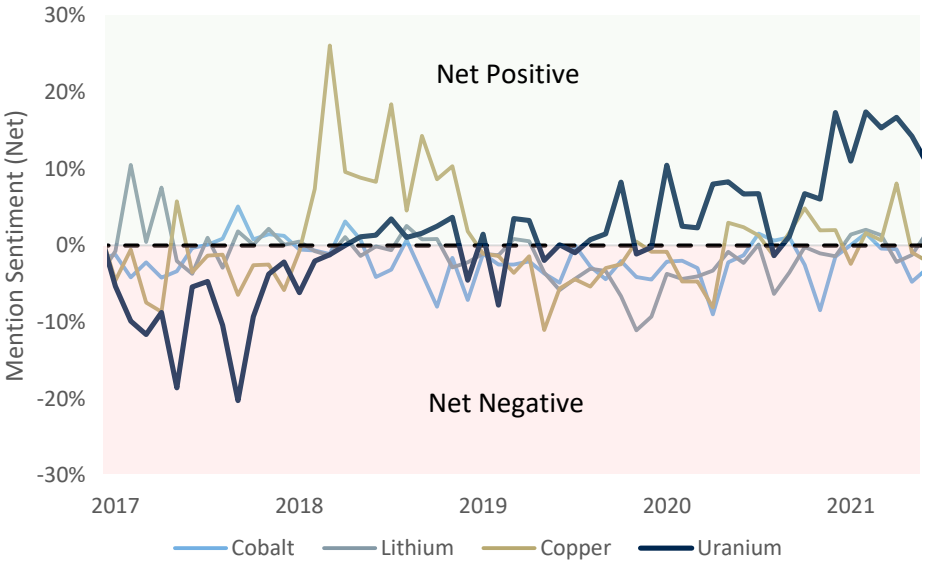
Exhibit 5 - Uranium social media activity is higher relative to other clean energy commodities



Source: RBC Elements, RBC Capital Markets, Brandwatch

Social media sentiment towards uranium has also improved significantly since December 2020, especially relative to other clean energy commodities. Sentiment turned neutral as uranium prices bottomed in 2018, gradually improved in 2020 as prices benefited from COVID-related shut-downs, and moved noticeably higher starting late-2020.

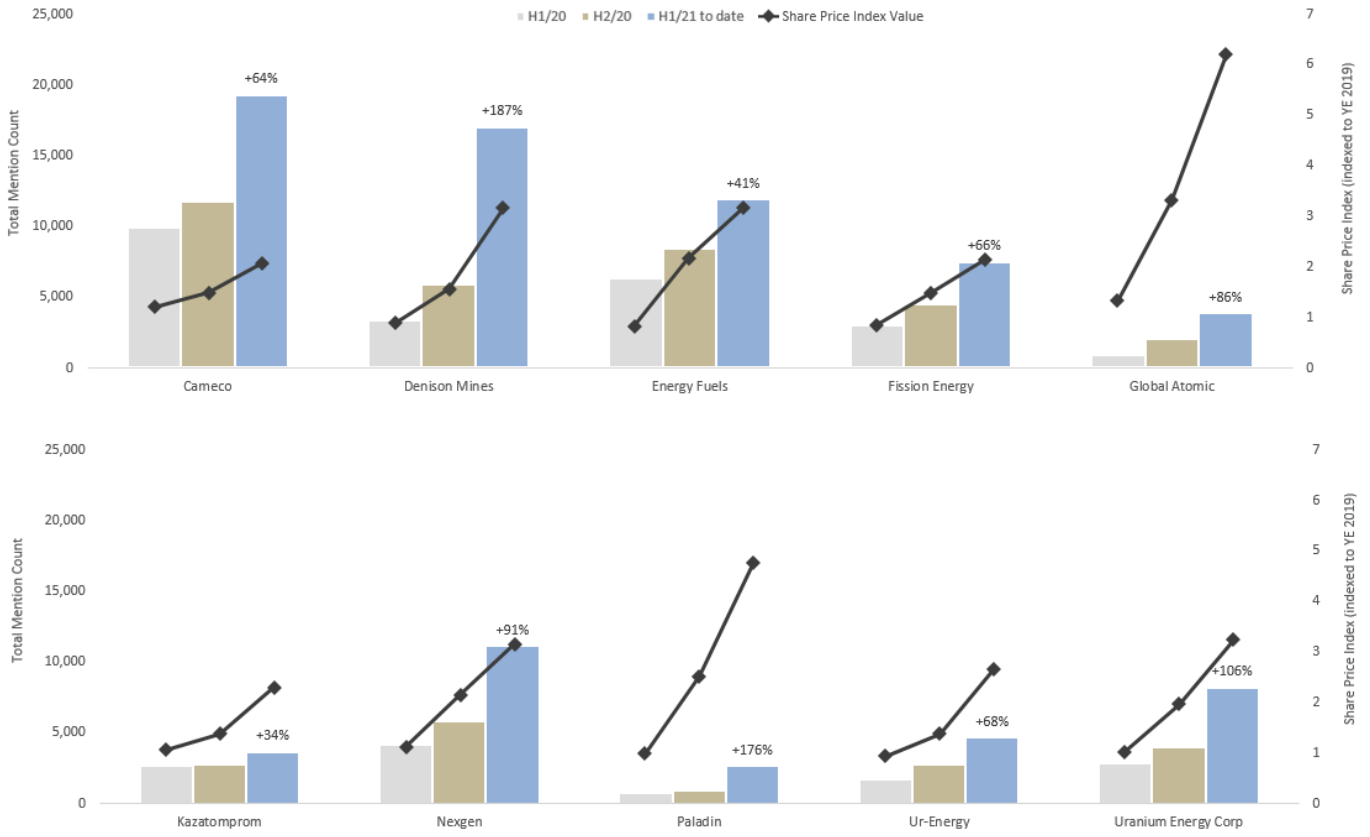
Exhibit 6 - Sentiment towards uranium has improved significantly since December



Source: RBC Elements, RBC Capital Markets, Brandwatch

Looking at specific companies, we see a similar trend with increased social media activity correlated with strong equity performance.

Exhibit 7 - Social media activity for specific uranium companies has also increased along with equity values



Source: RBC Elements, RBC Capital Markets, Brandwatch

Most frequently asked questions on uranium

With the rise in uranium equities and increased attention on the sector, investor inbounds on the sector have also increased. In this report, we have compiled our in-depth answers to the most frequently asked questions.

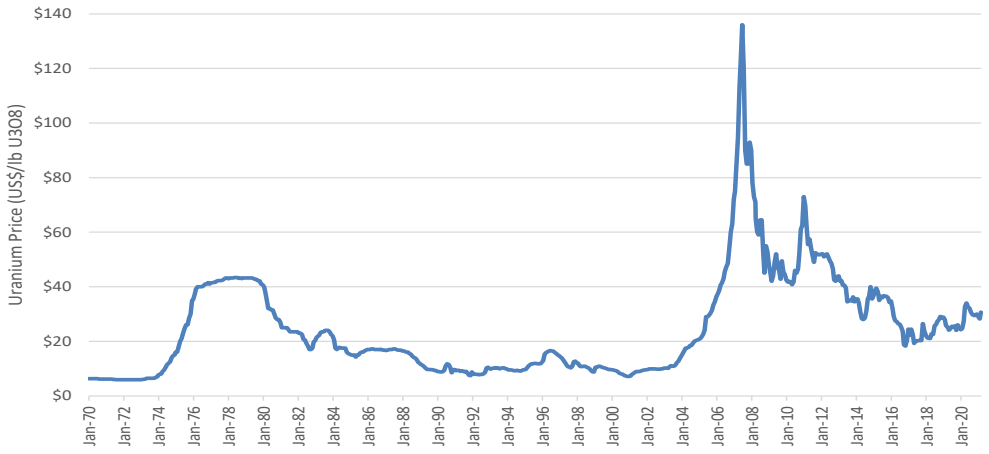
How does the current market situation compare to prior bull market periods in uranium?

While we expect uranium prices to increase over the next several years, we do not think the current market situation is reminiscent of prior periods when uranium prices rose sharply in a short period of time. We believe more moderate nuclear capacity growth expectations, relatively high inventories, solid contract coverage, and idled capacity point to a more moderate path to higher prices.

We note two prior significant uranium bull markets – 1973 to 1976, when prices rose 570%, and 2003-2007, when prices rose 1,230%.

- The 1973 to 1976 period was characterized by expectations for significant growth in nuclear generating capacity, an international uranium cartel, concerns over lack of enrichment, change in expectations for uranium reprocessing, and significant inflation.
- The 2003 to 2007 period was characterized by a nuclear renaissance in the Western world and new nuclear growth in China, unexpected supply interruptions due to mine floods, low utility inventories, low contract coverage, the emergence of hedge fund uranium purchases, and a global commodity super cycle. The combination of these factors placed significant pressure on utilities to secure uranium and sparked the sharp rise in uranium prices during this period.
- We think the current uranium market is more indicative of a gradual rise in uranium prices due to a long-term market deficit forming as a result of moderate demand growth and mine depletion. We believe the main characteristics that formed the sharp increase in prices in the 1973 to 1976 and 2003 to 2007 period are either different (more moderate demand expectations, adequate utility inventories, excess enrichment) or not present in today's market (marketing cartels, supply shortage).

Exhibit 8 - Uranium prices have seen two significant bull periods



Source: UxC, RBC Capital Markets

Major drivers during the 1973 to 1976 period.

- **Great expectations for the nuclear age:** The first commercial nuclear reactors were connected to the grid in the 1950's and capacity steadily grew in the 1960's. By 1970, nuclear generating capacity was 16 GW and expectations for future growth in commercial nuclear generating capacity in the early-1970's was significant – in 1970, the OECD forecasted installed nuclear capacity at 281 GWe by 1980; in 1973, the OECD raised forecasted installed capacity to 300 GWe by 1980 and forecasted 600 GWe installed by 1985. Actual installed capacity by 1980 was 133 GWe.
- **Uranium cartel:** In 1972, a uranium cartel was formed by uranium companies with explicit and implicit support from various governments of major uranium producing countries including Canada, France, South Africa, and the US. The cartel was initially formed to support uranium mining companies facing challenging market conditions in the late-1960's to early-1970's. As the uranium market tightened, cartel-like behavior by producers likely further amplified market tightness in the mid-1970's and contributed to the significant rise in uranium prices.
- **Enrichment capacity concerns:** As expectations for nuclear capacity growth continued to be revised higher in the early-1970s, there were increasing concerns among utilities that uranium enrichment capacity may not meet future requirements. Enrichment has significant barriers to entry due to high capital costs and technological challenges. Through the 1970's, the US held a virtual monopoly on enrichment due to a technological lead, while Western Europe was still in the early stages of building domestic enrichment capacity.
  Recall that enrichment and uranium can be partial substitutes – uranium can be overfed into the enrichment process, resulting in less enrichment required to produce the same amount of enriched uranium product and vice versa. Due to expectations for a shortage in enrichment capacity, uranium demand forecasts and contracting activity were based on the assumption of higher uranium requirements, which drove uranium demand and contracted volumes higher. Ultimately, enrichment capacity remained in over-supply and the excess uranium purchases resulted in an inventory build-up.

- **Reprocessing fails to meet potential:** In the early years of the commercial nuclear industry, there were expectations that spent nuclear fuel would be reprocessed to provide up to 1/3 of nuclear fuel requirements. However, there were proliferation concerns regarding the plutonium recovered from spent fuel that could potentially be used for the production of nuclear weapons. Additionally, the economics and technical feasibility of reprocessing spent nuclear fuel proved challenging. As utilities realized only small amounts of reprocessed fuel would be available for future nuclear fuel requirements, demand for fresh uranium and nuclear fuel rose to compensate.

Major drivers during the 2003 to 2007 period.

- **Nuclear renaissance:** Following limited nuclear capacity growth in the 1990s, the 2000s held promise of a nuclear renaissance with both developed and developing countries considering new nuclear builds. According to historical WNA data, the number of nuclear reactors under construction, planned or proposed rose from 138 at the end of 2004, to 350 by the end of 2007 and 482 by the end of 2009. Expectations for significant growth in nuclear reactor builds drove uranium demand expectations and long-term contracting activity. In particular, China contracted and purchased significantly more uranium than was required by domestic reactors, building up a large uranium inventory – UxC estimates China contracted ~320Mlbs from 2006-2011, accounting for almost half of non-US contracted volumes.

- **Continuous supply disruptions:** In the early-to-mid 2000's, the supply side experienced several unexpected disruptions that helped tighten the market. In 2001, there was a fire at Olympic Dam's solvent extraction facility and production did not recover to near previous levels until 2004. In 2002, Rabbit Lake's re-start encountered difficulties and started slower than expected. In 2003, McArthur River's production was negatively impacted by a flood. In 2004, Tenex terminated its contract to supply GNSS with uranium, causing concern that utilities may not receive previously contracted material. In 2006, two major floods at the Cigar Lake project significantly delayed start-up of production that had already been contracted. In 2006 and again in 2007, production at the Ranger mine was negatively impacted due to heavy rains, which resulted in Energy Resources of Australia (owner of Ranger) declaring Force Majeure.
- **Low inventory and contract coverage:** By the early 2000's, Western utilities had low uranium inventories following efforts in the 1990's to reduce large inventory holdings. In the US, nuclear utility requirements coverage dropped to ~1 year by 2003, which significantly increased pipeline risk for nuclear reactor operators. Fuel management practices were more conservative in Europe, but requirements coverage still dropped to <2 years by 2005.
- **Financial interest enters the market:** As the uranium market started to tighten in the early-2000's, financial demand for physical uranium was added to the market, which further limited supply for utilities. Hedge funds began investing in physical uranium in 2003/2004 and Uranium Participation Corp. was formed in 2005 as a vehicle for investors to easily gain exposure to physical uranium.

Major market drivers in current market.

- **Moderate growth expectations:** We expect nuclear capacity to grow at a moderate 2% CAGR through the next 15 years, reaching 486 GWe by 2035, up from 367 GWe in 2020. China will likely be the main growth driver as the country remains committed to nuclear power to meet growing electricity needs while also lowering carbon emissions. We forecast 7% CAGR in China, with nuclear capacity reaching 135 GWe by 2035, up from 48 GWe in 2020, while the rest of the world grows at a 1% CAGR.
- **Enrichment remains in over-supply:** Excess enrichment capacity continues to have a negative impact on the uranium market, although this has improved. Capacity has gradually decayed without continued re-investment and the negative impact from extra uranium supply due to underfeeding and tails re-enrichment has diminished, but contract tails assays have also declined, which reduces uranium demand (recall lower tails assays require more enrichment, but less uranium). We expect the enrichment market to move into better alignment over the next 10-15 years as nuclear generating capacity rises and enrichment capacity continues to gradually decay without significant re-investment, but the market will likely remain in enrichment over-supply through at least 2030.
- **Utility and contract coverage are comfortable:** Western utility inventories remain comfortable relative to historical levels despite draw-downs in recent years after reaching their peak in the mid 2010's (2013 for European inventories and 2016 for US inventories). We estimate US utility requirements coverage at 2.4 years, compared to 1.9 years average coverage and 1 year coverage in 200 and European utility coverage at 2.1 years, compared to 2.3 years average coverage.
- **Idled supply on the sidelines:** Producers have cut production in recent years in response to a low-price environment, which has resulted in significant idled capacity sitting on the sidelines waiting for prices to improve. Cameco idled Rabbit Lake (4Mlbs annual production) and Smith Ranch-Highland (1-2Mlbs annual production) in 2016, and McArthur River (18Mlbs annual production) in 2017. Kazatomprom is operating at -20%

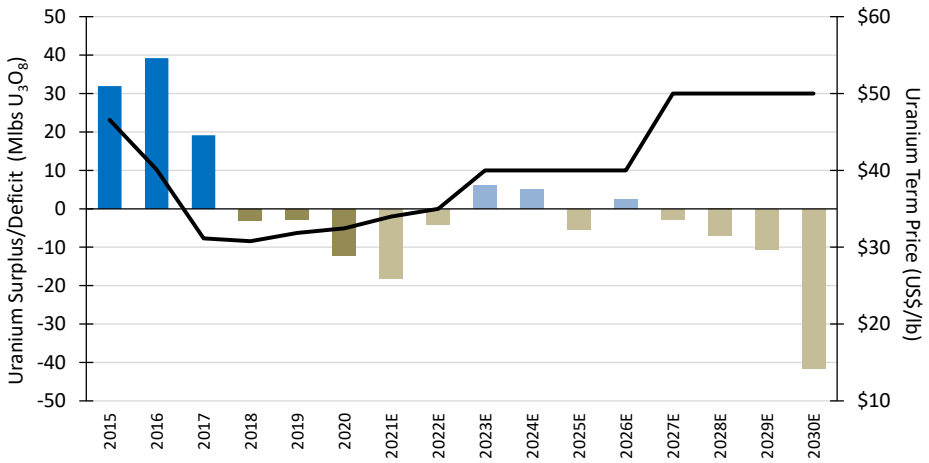
below planned production, which would imply 15Mlbs idled annual production. We also note potential re-starts at $40-50/lb from Paladin Energy's Langer Heinrich (4-5lbs annual production), Lotus Resources' Kayelekera (2-2.5Mlbs annual production, and Boss Resources' Honeymoon (1-2Mlbs annual production).

- **Financial interest renewed:** Non-utilities have been active buyers in the uranium market, reducing excess supply and helping the recovery in uranium prices. In recent years, producers such as Cameco, Orano, and Kazatomprom have been active buyers in the uranium market to meet delivery commitments and replace lost production from idled capacity. In H1/21, junior uranium mining companies and physical uranium holding companies have combined for ~15Mlbs of physical uranium purchases. Hedge funds were active buyers as uranium prices rallied from the low-$20/lb level in 2018/19, but have been only moderately active in 2021. The upcoming takeover of Uranium Participation Corp. by Sprott, followed by an expected US listing, could widen the investor base for physical uranium and result in more financial buying in the market. However, we note the significant amount of non-utility buying has only pushed up uranium prices moderately and we believe renewed utility demand is required for a full market recovery while physical uranium purchases by non-utilities can only aid the recovery process.

Is the uranium market currently in a deficit?

We believe the uranium market is in a balanced to slight deficit situation, excluding the recent temporary disruptions to supply in 2020 and 2021 due to COVID-19. In the next several years, we expect moderate demand growth to be matched by the re-start of supply that is currently idled as prices rise, keeping the market in relative balance through the mid-2020s. Longer-term, we see a significant deficit forming in the late-2020s, due to nuclear capacity growth and mine depletion.

Exhibit 9 - Uranium market balanced through mid-2020's, with a longer-term deficit



Source: UxC, RBC Capital Markets estimates

When considering uranium S&D, we think there are many important points to consider. At best, any projections of surplus or deficit are rough estimates given the many unknown variables on both demand and supply. We therefore have to also consider factors such as inventory levels, contract coverage, idled supply, and purchasing behavior in making an assessment on the state of the uranium market. Given our S&D projection for +/- 10Mlbs surplus/deficit through 2027, along with relatively high inventory levels, solid contract coverage, and idled supply, we consider the market as relatively balanced.

- Uranium demand is an estimate with many variables and a long fuel chain between the mine and loading into a reactor. Actual uranium requirements can be significantly impacted by changes in tails assays, fuel burn-up, fuel enrichment, capacity factors, and maintenance schedules. Contract tails assays have declined from ~0.3-0.35% prior to the early-2000s to ~0.25% in the 2000s through to about mid-2010's, and then declined further to ~0.20% or lower in recent years – note that a 0.01% change in tails assay can result in 2-3% change in uranium demand. The WNA estimates uranium demand based on 0.22% tails assays, which could imply estimates that are ~4% higher than actual requirements. Fuel burnup has increased over time and is generally higher for newer generation reactors, which allows more energy to be extracted from the same amount of uranium. The industry is also considering the use of slightly higher enriched fuel, which could extend reactor cycle times and lower natural uranium requirements.
- Uranium purchases generally do not match uranium demand estimates, as demand estimates are based on uranium used in a reactor, but uranium purchases can happen many years before being loaded into a reactor. The nuclear fuel chain from mine to reactor can take 2-3 years and utilities may opt to make strategic purchasing decisions to build-up or draw-down inventory. Also, most utility uranium purchases are made through long-term contracts, which may not end up matching actual reactor operations and can also result in inventory build-up or draw-down. Two good examples – China made significant purchases during the past decade (600-700Mlbs based on imports plus domestic production), but actual uranium usage in reactors has been lower (~250-300Mlbs), resulting in an inventory build-up. Also notably, China's large contract signings in 2010 and 2011 were positive drivers for the market, even if deliveries happened over the subsequent 10-year period. We expect Japan to see uranium demand rebound through the coming decade as reactors come back online, but purchases will likely be limited due to high inventories and the demand estimated for Japan may have limited market impact.
- The nature of the nuclear fuel market, with a long supply chain, long-term contracts, and significant inventory moves can mean the impacts on S&D balances take a long time to play out. A market can be considered to be in a deficit or in a surplus, by the strict definition of comparing uranium demand to supply, but prices may not react accordingly. For example, prior to the bull market in the mid-2000s, the uranium market was technically in deficit for over a decade, but prices languished due to inventory draw-downs. During the mid-2000's bull market, the market was technically in surplus, but low inventories, low contract coverage, and high uranium contracting pushed prices up.
- Secondary supplies play a big role and come with unknowns. Secondary supply is primarily from enrichment, government stockpiles, and reprocessed fuel. Enrichers present the most variability and have been significant providers of secondary uranium due to underfeeding and re-enrichment of tails. Actual operating and contract tails assays can be within an estimated range (operating tails assays likely won't go below 0.10% and contract tails assays are likely in the range of 0.15-0.25%), but flexing up and down these ranges can lead to significant variability in supply. Enrichers are also generally guarded about actual capacity and investment plans, which add further uncertainty to forecasts. US government inventory sales have declined recently and are generally well known as the information is public. Reprocessed fuel use can have some variability, but can only be used in certain reactors and there is limited capacity. However, Russia is making efforts to use more reprocessed fuel, which could be used more prominently in domestic and exported reactors in the future.
- There is significant idled supply that could re-start if prices were higher, approximately 40-50Mlbs annually. While there may be a deficit in any given year due to planned or unexpected production curtailments, we would not consider the market as being in a sustained deficit until idled production was brought back online and new production was required.

- State entities control a significant amount of supply, which adds uncertainty to actual and forecasted production. Approximately 75% of mined production has some sort of state influence (if we include Kazatomprom). Most state-controlled uranium miners do not publicly report on actual production or provide guidance on future production plans, and could take actions that may be perceived to be uneconomic (i.e. CGN ramping up the high-cost Husab mine or CNNC extending the high-cost Rossing mine). Additionally, enrichers are all state-owned with varying levels of state influence (with Russia's Rosatom likely the most influenced) and could place strategic decisions ahead of economic decisions (i.e. Russia focusing on reactor exports for geopolitical purposes).

What is the potential impact from financial interest to invest in physical uranium?

We think recent renewed financial interest to invest in physical uranium should help accelerate the recovery in uranium prices to better reflect production economics by reducing uncommitted supply in the near-term. The actual impact on uranium prices would depend on the amount and timing of further capital deployed to invest in physical uranium compared to the amount of uncommitted material still available, and both factors are relative unknowns. However, we note that significant capital has been invested in physical uranium in H1/21 and uranium prices have been up only slightly.

In 2021, junior companies and physical uranium holding companies, supported by capital from equity raises, have made significant purchases, while hedge fund activity has been moderate, with purchases offset by some selling. We estimate junior uranium companies and physical uranium holding companies have purchased ~15Mlbs for ~$430M so far in 2021. Sprott's takeover of Uranium Participation Corp. is anticipated by market participants to add further financial interest in physical uranium purchases with a US listing and at-the-market equity offerings. Given significant capital that has already flowed into physical uranium and equities in 2021, a key question going forward will be how much capital remains available to invest in physical uranium.

Further financial buying of physical uranium in the spot market has placed the market into slight backwardation, pushing spot prices above term prices. Market backwardation could be an indication for utilities to enter into longer-term contracts and we have seen increased utility activity in the long-term market in anticipation of potential future financial interest in uranium. However, we note that uranium term prices recently declined slightly as utilities remain patient and opportunistic with relatively solid inventory and contract coverage.

Ultimately, while financial interest in uranium can support a recovery, we think a full uranium market recovery will require increased utility interest, further draw-downs in inventories, and a true deficit requiring new mine supply after idled production has been re-started. We also highlight the risk that some of the uranium purchased by non-utilities could be re-sold back into the market, potentially tempering future price increases.

Financial interest in physical uranium was first introduced to the market during the last uranium bull market in the mid-2000s. Hedge fund purchases of uranium in 2004/2005 further tightened a market that was already facing unexpected supply shocks, low inventories, low contract coverage, and strong demand. This was followed by the establishment of Uranium Participation Corp. in 2005, an investment company that held physical uranium, providing a readily accessible investment vehicle for investors to gain direct exposure to the uranium price. Based on this historical precedent, financial interest in physical uranium has been viewed as a potential indication for a uranium market recovery, but we note that there were many other factors that also helped drive prices higher in the mid-2000s.

What has been the impact on uranium equities from clean energy and ESG investing?

We think the nuclear and uranium sector has seen increased investor interest as a clean energy investment, as nuclear energy sees increasing acceptance as a necessary part of the future energy mix to combat climate change while meeting growing electricity demand. Subsequently, we believe investors have been interested in the uranium sector as a potential avenue to benefit from expected growth in the nuclear industry and this may have helped lift valuations.

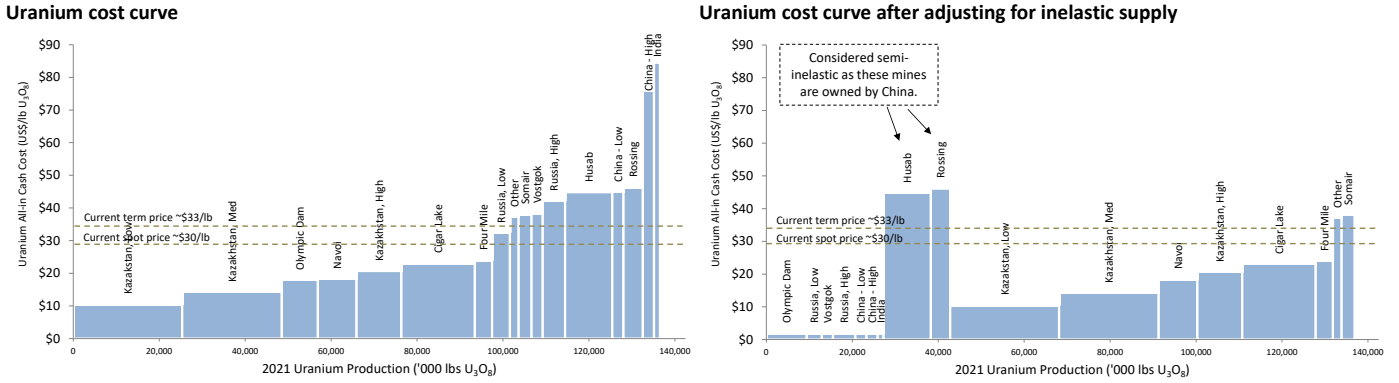
However, according to work done by RBC's ESG strategist Sara Mahaffy, we have not seen significant fund flows into the uranium sector from ESG-specific funds. We think this may be possible in the future as nuclear and uranium become more accepted by the investment community, but this has not been a feature in the current uranium equity rally.

What is cost curve support for the uranium market?

We think the uranium cost curve supports prices in the $30-40/lb range while the market is in a balanced to slight deficit position. We note that while a significant portion of the cost curve is technically above $30/lb, we view much of this higher-cost supply as relatively inelastic. Adjusting for this inelastic supply points to cost support at $30-40/lb. While the adjusted cost curve may indicate weak cost support, we think relatively high market concentration and profit-driven motives should limit periods of prices below cost support.

We consider the following as relatively inelastic producers that are not price sensitive – Olympic Dam produces uranium as a by-product; state-controlled production (China, Russia, India, Ukraine) is mostly for domestic use; Husab and Rossing located in Namibia are high-cost mines owned by Chinese state companies.

Exhibit 10 - Uranium cost curve points to support at ~$40/lb



Source: UxC, Company reports, S&P Global, RBC Capital Markets estimates

What is the incentive price for new uranium production?

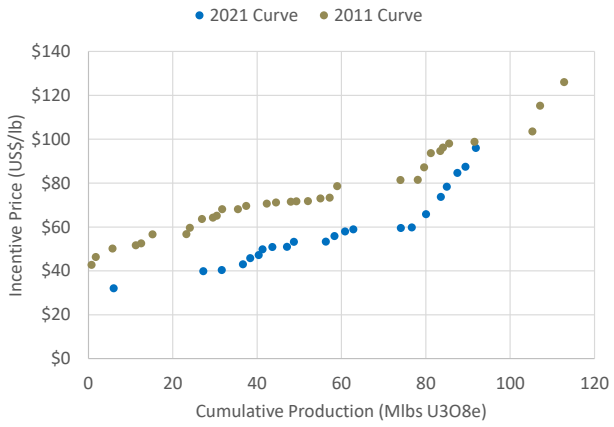
We estimate the long-term incentive price at ~$50/lb, as higher uranium prices will likely be required to incentivize new builds as the market moves into deficit in the late-2020s. We note that the incentive price curve has changed significantly over the past 10 years with new projects, potential re-starts from idled projects, technical changes, and project optimizations. We see two main changes when comparing the current cost curve as of 2021 vs. the cost curve from 2011 – the incentive price is ~$10/lb lower along the new curve and the lower-

end of the new incentive curve is occupied by relatively large projects vs. several smaller projects on the old curve.

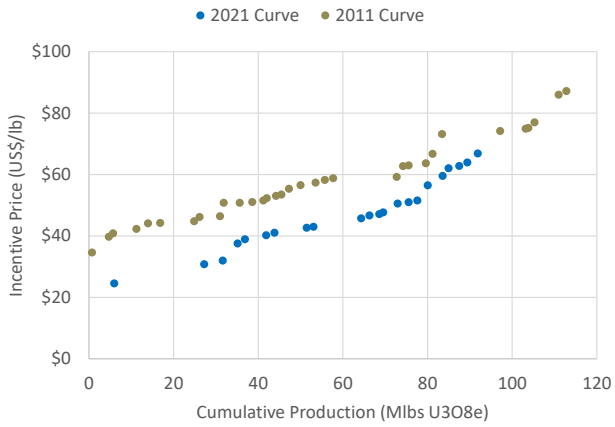
As a result of these changes, potential market deficits could be filled by fewer large projects at a lower incentive price until a larger deficit opens up. However, we note many of these new, larger projects are not permitted, and if a deficit were to materialize sooner than expected, the market may instead see higher incentive prices that allow higher-cost re-starts to come online.

Exhibit 11 - Uranium incentive price curve points to long-term prices at ~$50/lb

30% IRR incentive curve



15% IRR incentive curve



Source: UxC, Company reports, S&P Global, RBC Capital Markets estimates

What is the impact from small modular reactors on demand?

We expect SMRs (small modular reactors) to gain increasing prominence in the nuclear industry long-term, but do not foresee any significant impact on our market outlook through at least 2035. We also note that some SMRs are based on advanced nuclear technologies that use higher enriched fuel or reprocessed fuel, which could pose a threat to uranium demand if these advanced SMRs are used to replace current technology. We think initial SMR adoption will be complementary to current reactor technology and then could potentially replace current designs over the very long-term (30-40 years from now).

SMRs, nuclear reactors with 300 MWe capacity or less, hold the promise of several potential benefits over current reactor designs including lower costs, improved safety, deployment flexibility, and better efficiency. Many countries and companies are making significant investments to develop different SMR designs – including micro-sized SMRs, the IAEA (International Atomic Energy Agency) tracks over 70 SMRs in various stages of development. However, the vast majority of these designs are still at the development stage and are likely 10+ years from broad commercialization. SMRs will also likely face significant regulatory hurdles, especially for any designs that use advanced nuclear technologies or are deployed in novel applications.

Has the impact from excess enrichment improved?

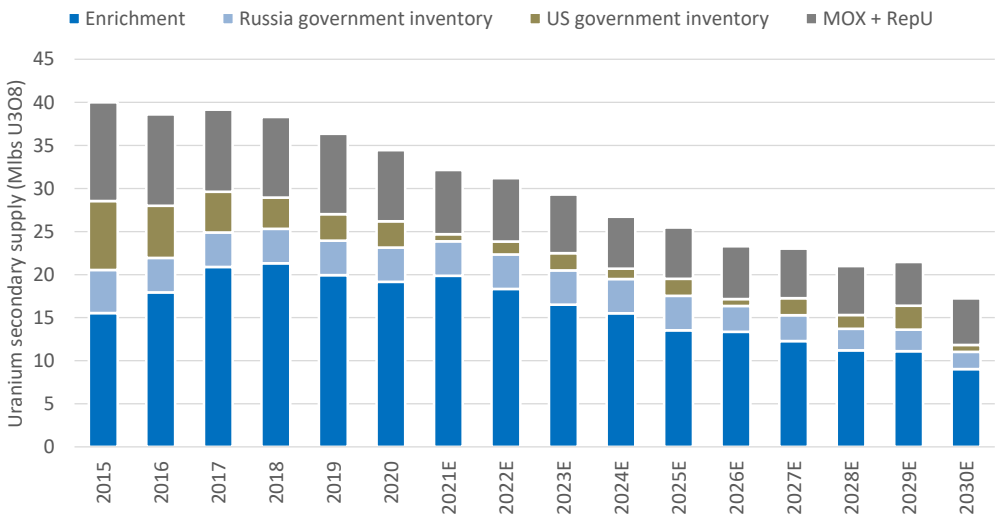
We think the impact on the uranium market due to excess enrichment capacity has diminished, but continues to be an overhang that will remain at least through 2030. Underfeeding and re-enrichment of depleted tails has gradually declined, but this has been

partially offset by lower contract tails assays that reduce uranium requirements. We expect the overhang from excess enrichment to improve over time as capacity gradually decays due to lack of re-investment and demand improves as nuclear generating capacity rises.

Excess enrichment capacity is the result of prior expectations for nuclear capacity growth against the reality of slower growth and reactor shut-downs following the Fukushima accident in 2011. Enrichment capacity is relatively inelastic – once a centrifuge starts spinning, it generally cannot stop without incurring significant damage – and new reactor builds or re-starts have been limited, so the over-supply situation has been slow to correct. We think enrichers (outside of China) have recognized this situation and are likely to let the gradual decay in enrichment capacity meet slowly rising demand.

Underfeeding and re-enrichment of depleted tails have been the main source of secondary supply that further worsened the uranium market over-supply following Fukushima. As new enrichment contracts are signed and enrichment demand improves due to low enrichment prices, the impact from these secondary sources should be reduced. However, we do not expect these supply sources to go away completely as the enrichment market is likely to remain in over-supply. We note Urenco has committed to being a seller of natural uranium while Rosatom has dedicated an enrichment plant to the re-enrichment of tails.

Exhibit 12 - Uranium secondary supply set to decline

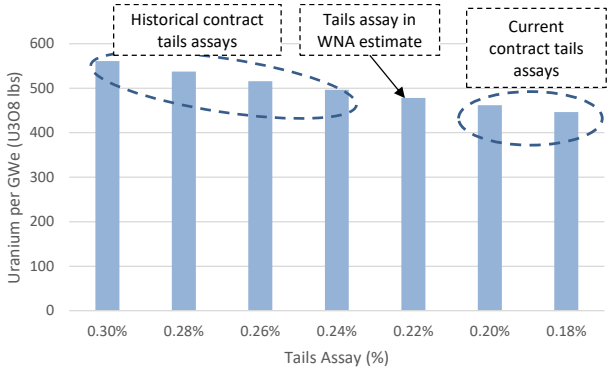


Source: UxC, RBC Capital Markets estimates

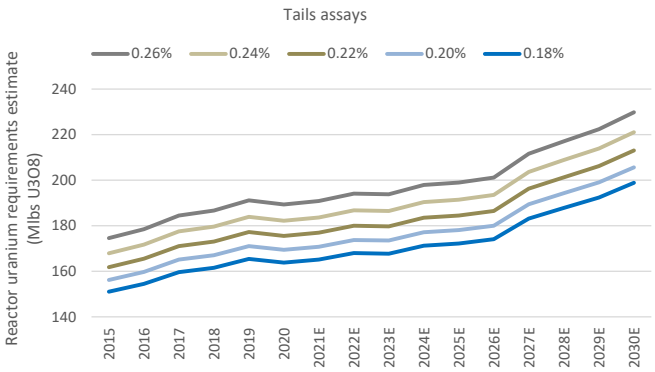
We also note that while secondary supply from underfeeding and re-enrichment have diminished, contract tails assays have also declined, resulting in lower uranium requirements. Recall that enrichment and uranium can be partial substitutes. Newly signed enrichment contracts have been concluded with tails at 0.18-0.20%, which is lower than the 0.25% average prior to Fukushima and lower than the 0.22% used by the WNA to forecast demand. The relationship between tails assay and uranium requirements is not linear and the final enriched product assay also plays a role, but the relationship can be roughly calculated as +/-0.01% change in tails assay equals +/- 2% change in uranium required.

Exhibit 13 - Changes in contract tails assays can have significant implications on uranium demand

Uranium per GW at different tails assays



Global reactor uranium requirements at different tails assays



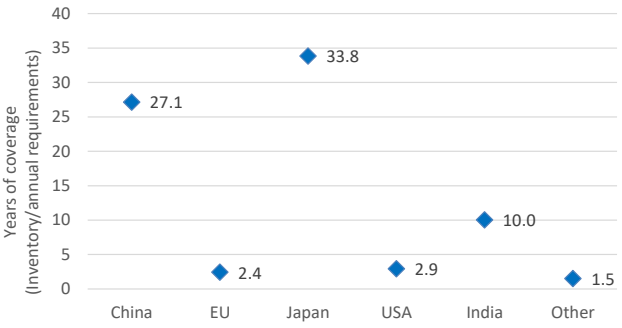
Source: UxC, RBC Capital Markets estimates

What is the current inventory situation?

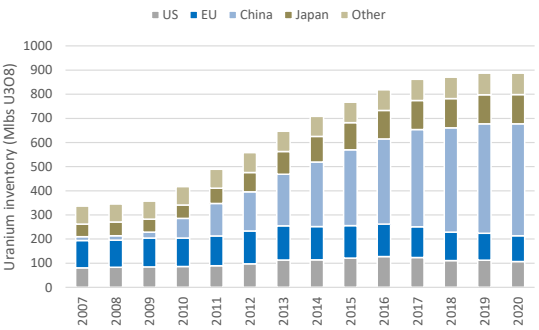
Global uranium utility inventories have stabilized over the past several years, but continue to remain elevated relative to historical levels. Moderate inventory declines in the US and Europe have been offset by increases in China and India, while Japan continues to maintain a sizeable stockpile as reactors are slow to re-start.

Exhibit 14 - Global utility inventories are high, but have started to plateau

China and Japan inventory will be key factor in the market



Global uranium inventories



Source: UxC, RBC Capital Markets estimates

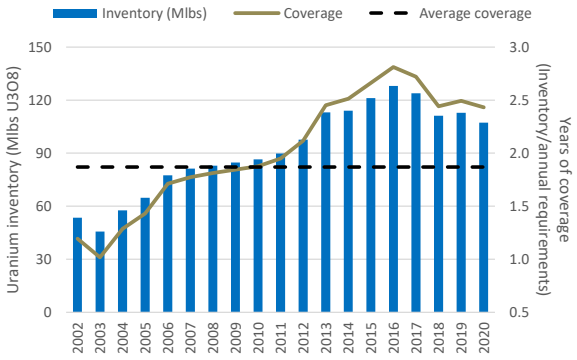
In the US, utility uranium inventories have declined from peak levels in 2016, but coverage remains higher relative to historical levels and inventory remains comfortable. According to the US EIA, utility inventories in 2020 were down -16% from 2016. However, uranium requirements coverage has declined to only 2.4 years, down from 2.8 years in 2016, and remains above the historical average of 1.9 years, as recent reactor closures and lower contract tails assays reduce uranium requirements.

In Europe, utility inventories have also declined from peak levels in 2013 and coverage levels are slightly below average historical levels, but upcoming reactor closures will likely reduce future requirements and uncovered requirements are low. We estimate utility inventories in 2020 are down ~25% from 2013 levels (the Euratom Supply Agency only has reported data up to 2018) while requirements coverage has declined to 2.1 years, down from 2.7 years in

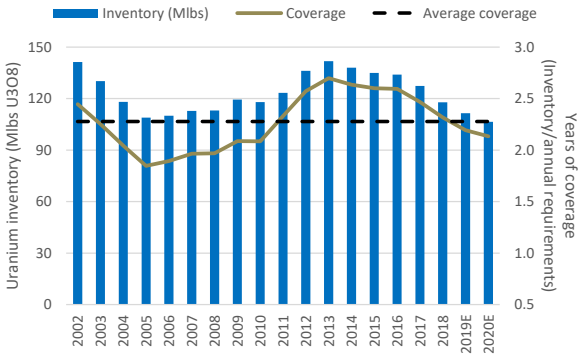
2013, and slightly below the 2.3 years historical average. However, if we calculate coverage after accounting for upcoming reactor closures, coverage would be 2.4 years.

Exhibit 15 - Western utility inventories are slowly being drawn down, currently at comfortable levels

US coverage above average



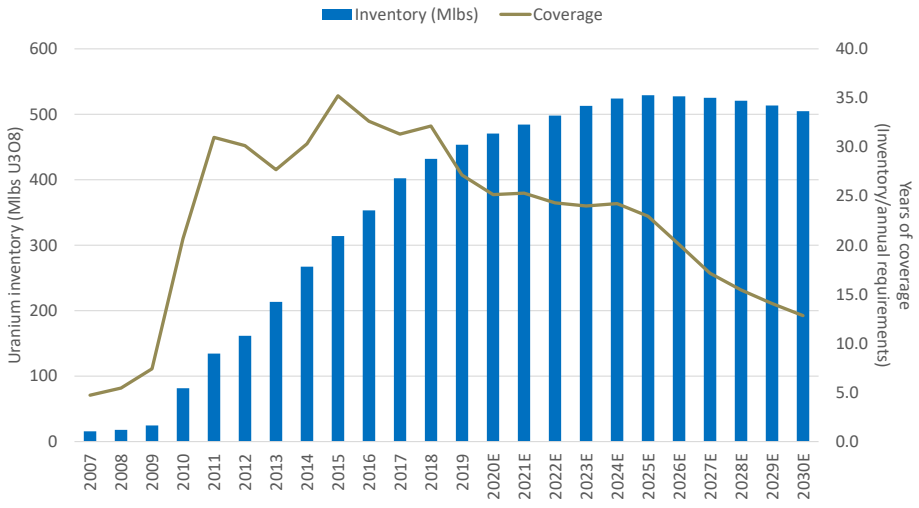
European coverage around average



Source: US EIA, European Commission, RBC Capital Markets estimates

China has seen uranium inventories rise significantly over the past decade, as the country has built up a vast stockpile to ensure security of supply for the upcoming nuclear reactor builds. China has been absorbing the majority of excess global uranium production, with uranium purchases well-ahead of domestic reactor requirements. We estimate Chinese uranium inventories in 2020 at ~450Mlbs U3O8e based on historical production, import, and requirements data, which would equate to >10 years requirements coverage based on the 2030 nuclear generating capacity target of 100-120 GWe.

Exhibit 16 - China has a large uranium inventory to back up nuclear capacity growth

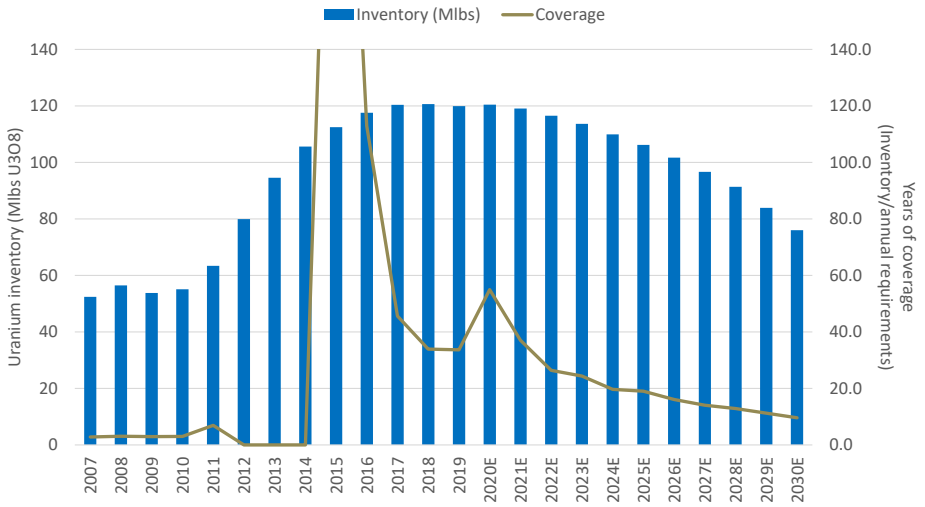


Source: UxC, RBC Capital Markets estimates

Japan continues to hold significant uranium inventories as reactors have been slow to re-start and utilities have only leaked small volumes onto the market. We estimate that Japan has roughly 100-120Mlbs U3O8e of inventory, and we do not expect significant volumes to be monetized due to low uranium prices, as much of the inventory is used as collateral on

utility balance sheets. However, if prices were to rise, we could see some utility inventories re-enter the market. We estimate the current stockpile equates to ~10 years requirements coverage assuming the re-start process is completed with 21 reactors back on-line. As such, we do not expect Japanese utilities to be significant uranium buyers through at least 2030.

Exhibit 17 - Japanese inventory remains high, likely limiting purchases through 2030



Source: UxC, RBC Capital Markets estimates

How does the Biden administration and EU support for nuclear energy impact our demand forecasts?

We believe recent policy initiatives in the US and Europe to support nuclear energy as part of the transition towards de-carbonization are positive, as this increases the likelihood that currently operating nuclear reactors will remain in operation and reduces the risk of further shut-downs. Both regions have also indicated strong support for the development of advanced and small modular reactors. However, we think support for net new nuclear capacity in the US and Europe remains elusive due to significant cost and regulatory hurdles, and there are limited prospects for significant growth in nuclear capacity over the next 10-15 years. As a result of increased support for currently operating nuclear capacity, we have raised our combined US and Europe generating capacity forecast to 197 GWe and 193 GWe by 2030 and 2035 respectively, up from 189 GWe and 178 GWe previously.

In the US, policy under President Biden has shifted to be more positive for nuclear and we believe it should translate into a moderate uptick in uranium demand as reactors stave off early closures. The focus of the administration is on reactor life extensions, improving the economics of existing plants, and development of advanced and small modular reactors. President Biden's proposed FY2022 budget includes a production tax credit to support at-risk power plants totaling $9.7B through 2031 and funding to procure advanced nuclear power totaling $3.5B through 2026. State governments have also indicated economic support for carbon-free nuclear energy, more recently with Illinois likely passing subsidies to support the Byron and Dresden power plants. Regarding new nuclear capacity, Southern Company's delayed Vogtle 3 reactor in Georgia is expected to start up in 2022 and Utah is working towards the potential construction of the first small modular reactor installations in the US with NuScale advanced reactors around 2030.

However, challenges remain for nuclear power in the US. The latest 2021 PJM energy capacity auction saw more nuclear capacity clear than in 2018, but three plants in Illinois failed to clear due to more competitive pricing. Exelon recently stated that the Braidwood and LaSalle nuclear plants remain at threat for closure if new subsidies are not granted and the Diablo Canyon reactors in California remain set for early closure in 2024/25. The appetite for building new large nuclear installations also remains low, and new proposed nuclear projects will likely rely on SMRs that may not be broadly commercialized until at least 2030.

In Europe, the European Commission has indicated that nuclear energy is on the path to being included in the EU Taxonomy Regulation following conclusions by the European Commission's Joint Research Center that nuclear energy does not cause significant harm. The Taxonomy Regulation is a classification system to identify environmentally sustainable economic activities that helps direct sustainable investment. The potential inclusion of nuclear energy in the Taxonomy may support continued and new investment of nuclear capacity in Europe and alleviate concerns regarding further early reactor closures.

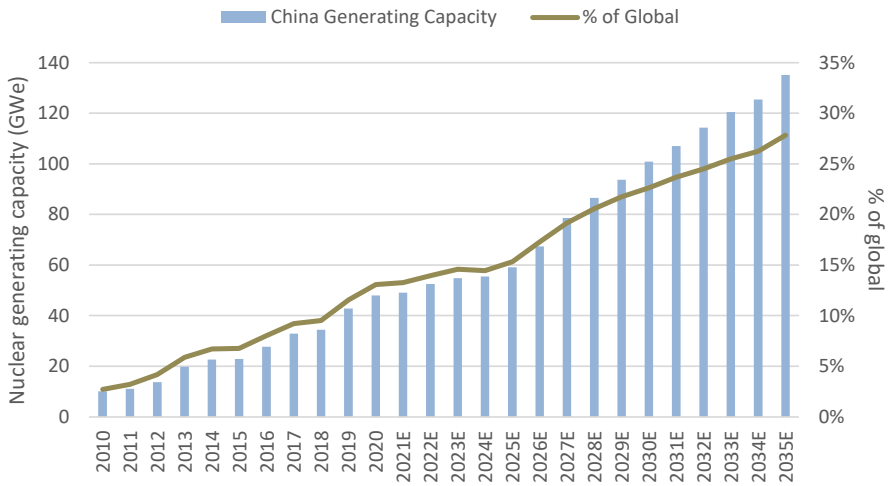
However, we continue to forecast a potential 10% decline in nuclear capacity in West & Central Europe by 2030, due to reactor closures in Belgium, Germany, and the UK. In Belgium, there is a slight chance that the newer Doel 4 and Tihange 3 reactors may be saved from closure set for 2025, if the government decides the reactors are needed to ensure stable electricity supply. In Germany, the nuclear phase-out is expected to be completed in 2022/23 and the government reached an agreement in March 2021 to pay ~$3B to utilities as compensation for the premature closure of nuclear reactors. In the UK, support for nuclear remains strong, but ageing gas-cooled reactors are set for retirement due to poor economics before new reactors are scheduled to come on-line in the late-2020/early-2030's.

How does nuclear growth in China impact our market outlook?

We think China will see significant nuclear capacity growth and uranium demand over the next decade and beyond as the country strives to reduce carbon emissions while meeting growing electricity requirements. However, China has also made moves to become more self-sufficient in the nuclear fuel cycle, including significant investments in uranium production in foreign countries, building up a large uranium stockpile, and constructing domestic enrichment capacity. We expect nuclear capacity in China to reach 101 GWe by 2030 and 135 GWe by 2035, up from 48 GWe in 2020, representing 7% CAGR through 2035. Based on our forecast for global nuclear capacity through 2035, China accounts for 73% of growth during this period. As China's nuclear capacity grows through the next decade, uranium requirements would also increase, but China's increased self-sufficiency allows the country's utilities to be more patient and opportunistic in market purchases.

China's 14th Five-Year-Plan unveiled in early-2021 calls for 70 GW of nuclear generating capacity by 2025, and government officials have made indications that the country aims to exceed 100 GW by 2030. The 2025 target is likely unachievable given the number of reactors currently under construction and the typical 5-6 year lead-time before start-up, but the target is indicative of the government's desire for growth in nuclear power going forward. Nuclear power currently accounts for only ~5% of electricity generation in China, which compares to ~10% globally and ~20% in the US. We expect China to significantly increase the mix of electricity generation from nuclear, but this will take time. We think the successful start-up of China's domestically designed reactors and import of Russian reactors opens the path to new construction activity following a lull in 2016-2019.

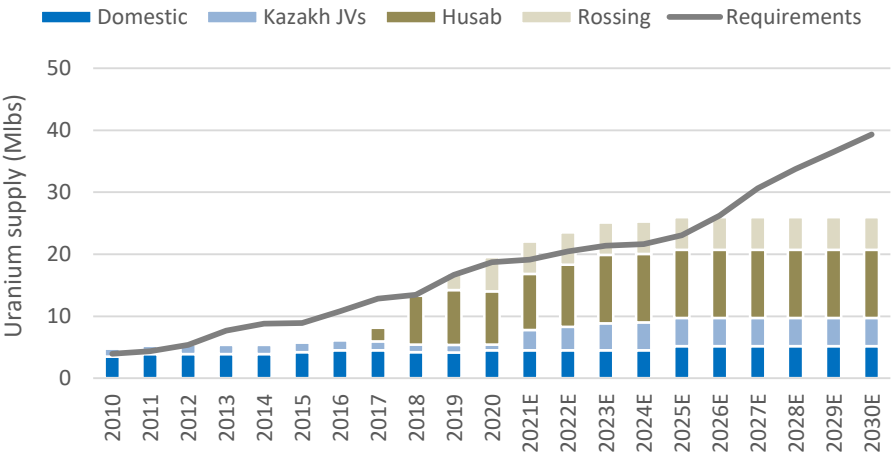
Exhibit 18 - China's nuclear capacity expected to grow significantly over next 10-15 years



Source: UxC, WNA, RBC Capital Markets estimates

On the supply side, we estimate Chinese-controlled annual uranium production at ~20Mlbs, increasing to ~25Mlbs by 2025, based on modest domestic production plus foreign-based production in Namibia and Kazakhstan – this amount would be sufficient to cover current annual uranium requirements for China's nuclear capacity through 2025, but would require increased supply later in the decade. This production is complemented by a large stockpile, estimated at ~450-500Mlbs, that has been built-up over the past decade. While we believe China intends to hold a large strategic reserve due to low domestic uranium production, the current inventory already equates to >20 years coverage of current requirements and >10 years of coverage based on our 2030 demand estimates.

Exhibit 19 - China has worked to secure uranium production



Source: UxC, WNA, Company reports, RBC Capital Markets estimates

We also note that enrichment capacity is currently higher than required, which may result in high operational tails assays and lower uranium requirements until more enriched fuel is needed as more reactors come online. Dr. Hui Zhang from the Harvard Belfer Center, a

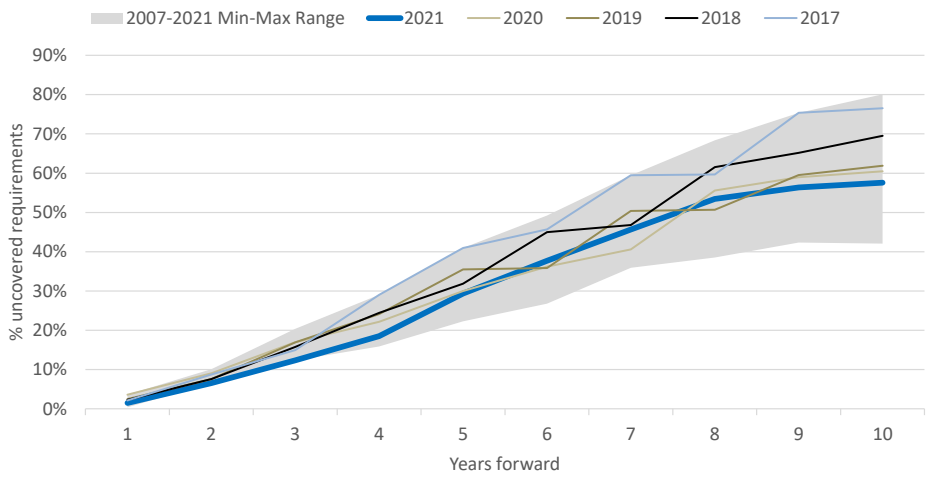
leading expert on the Chinese nuclear industry, has noted a slow-down in enrichment capacity construction due to over-supply.

Longer-term, China also continues to make efforts to develop a closed fuel cycle with investments in fast breeder reactors and spent fuel reprocessing despite unattractive economics and proliferation concerns. Two fast breeder reactors are scheduled for commissioning in 2023 and 2026, and two accompanying demonstration-sized spent fuel reprocessing plants are scheduled for commissioning in 2025 and 2030. We do not expect China to develop a full closed fuel cycle within our forecast period through 2035, but these moves further reflect the country's longer-term desire to be self-sufficient in the nuclear cycle.

Is long-term contract coverage expiring and are we about to see renewed contracting activity?

Contracting activity has remained fairly active in some regions and has actually been increasing in the US, which has resulted in uncovered requirements that remain relatively low when compared to historical levels. Comparing current uncovered requirements in 2021 to historical coverage, based on UxC's data, 10-year forward uncovered requirements globally are at the lower-end of the range for the next five years before rising to the middle of the range in year six. As such, while we think utilities will remain active in the long-term contract market to increase coverage beyond the mid-2020s, they are likely not urgently seeking coverage, but should continue to be opportunistic when terms are attractive.

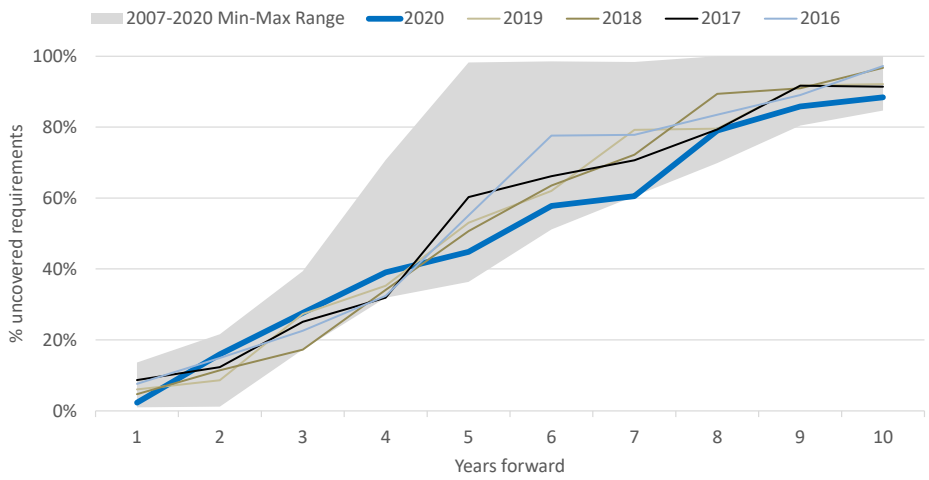
Exhibit 20 - Global uncovered requirements relatively low for next 5-years, move up afterwards



Source: UxC, RBC Capital Markets estimates

The US market is the most important to watch for contracting activity as US utilities typically have lower coverage and are more active in managing their contract portfolio relative to other regions. Notably, US utility contracting activity has increased over the past several years, with a significant increase in 2020 to 31Mlbs contracted, compared to the 20Mlbs annual average since 2012 according to data from UxC. As a result, unfilled requirements as reported by the US EIA for the 2020 marketing year were relatively low compared to historical levels, indicating relatively solid contract coverage for the next 3-4 years (we note this may be slightly under-reported depending on how potential reactor closures are included, but remains indicative of low unfilled requirements relative to historical levels).

Exhibit 21 - US requirements coverage remains comfortable relative to historical levels



Source: US EIA, RBC Capital Markets estimates

We think another important area to watch will be China, due to the country's ambitious nuclear growth plans, limited domestic uranium production, and historical contracts that are likely expiring in the early-2020s. In 2010 and 2011, China signed several long-term contracts with Cameco, Kazatomprom, and Areva (now Orano) for delivery of ~250Mlbs over a 10-year period. These contracts were entered to support China's nuclear growth plans, which were subsequently stalled by the Fukushima accident in 2011. Going forward, China has ambitious plans to grow nuclear capacity over the next 15 years – we estimate 7% CAGR in generating capacity through 2035 – and should be returning to the market for long-term contracting in the future.

However, contracted volumes in the next contract cycle could be lower than prior contracts and the approach to the market will likely be more sophisticated. The country has invested in significant uranium production in foreign countries while accumulating significant uranium inventories, which could delay contract settlements. We estimate Chinese-controlled annual uranium production at 20 Mlbs, increasing to 25 Mlbs in 2025, which should cover annual requirements through 2025, and inventories at 450-500Mlbs, which equates to >10 years coverage compared to our 2030 nuclear capacity forecast.

What could change our view to be more bullish or bearish?

We view the uranium market as balanced through the mid-2020s and in a deficit longer-term, which should support a moderate and gradual increase in prices that reflects production economics over time. However, we see several potential factors that could result in an upside scenario for uranium that features a quicker recovery and stronger prices than we expect in our current outlook.

Some potential factors that may result in a more positive market outlook are below.

- **Unexpected supply disruptions:** We view the current uranium market as in a balanced to slight deficit situation with idled capacity that can come online to meet steadily growing demand. However, if there was a significant unexpected supply disruption (such as when Cigar Lake flooded in 2006), we think the market could go into a more pronounced deficit earlier than expected.

- **More financial interest in physical uranium than expected:** We note there is currently significant financial interest in physical uranium, which we think should help tighten up the market by sequestering uncommitted pounds. However, we continue to believe a true recovery can only happen with increased utility buying and the need for new supply. However, if the financial interest to invest in physical uranium was significantly more than expected (i.e. multiple billions of dollars over multiple years), then the uranium market may enter a deficit sooner than expected and utilities may be forced to enter the market as inventory and contract coverage deceases.
- **Significant contracting activity by China:** We expect significant growth in nuclear capacity in China over the next 15 years, but the country has also built-up significant supply sources through investments in foreign mines and a large domestic uranium stockpile. During the past 10-years, China bought significantly more uranium than was required by domestic reactors, accounting for ~30% of all global uranium production. We think China will be more sophisticated and opportunistic in uranium procurement going forward given increased security of supply. However, if China decides to enter into significant contracting volumes (i.e. more than required), that would be positive to our uranium outlook.
- **Significant investment in new nuclear in developed regions:** Developed nuclear regions (the US, Europe, South Korea, Japan) are focused on maintaining existing reactors and there is limited scope for new nuclear capacity investments within the next 10-years. However, if the developed nuclear regions were to significantly increase investments in new nuclear, this could result in a new nuclear renaissance and would be considered a significant positive development to the uranium market. We see the potential for increased investment as small modular reactors are developed and commercialized post-2030, but note that some reactor designs may require less uranium than current designs.
- **Closure of enrichment capacity:** The current over-supply of enrichment capacity remains an over-hang on the uranium market despite reduced underfeeding and re-enrichment of tails. We expect the situation to improve over time through the decay of enrichment capacity due to the lack of re-investment and rising demand for enrichment for nuclear fuel. However, we see some risk of closure to the Gronau enrichment plant in Germany as the country phases out nuclear energy. Gronau accounts for ~5-6% of global enrichment supply and an early-unexpected closure of the plant could tighten up the enrichment market, which would have positive impacts on the uranium market.

Some potential factors that may result in a more negative market outlook are below.

- **Reduced nuclear capacity in developed markets:** While government support in developed nuclear markets has improved with increased recognition that nuclear can contribute in de-carbonization efforts, there are still economic and political risks to nuclear energy in these countries. We have assumed that the vast majority of currently operating reactors remain online and any significant unexpected closures would hurt our market outlook. In France, the government has outlined a plan to reduce nuclear energy's contribution to the country's energy mix to 50% by 2035, from 75% - we assume only moderate closures in our forecast. In the UK, the country is committed to maintaining nuclear energy, but ageing gas-cooled reactors are scheduled for closure over the next decade and will need to be replaced by new reactors that require significant capital investment. In Spain, changes to energy legislation may limit the payouts to nuclear plants for low-carbon energy and threaten the economics of currently operating reactors. In the US, federal and state governments have indicated economic support for existing nuclear reactors, but this would be required on an ongoing basis and many plants remain uneconomic without government support. In

Japan, the nuclear re-start has been slower than expected, and while nuclear likely remains a key to de-carbonization and meeting energy needs, there have been some recent indications that government support for nuclear has softened.

- **Increased supply before a deficit forms or unexpected new supply:** We forecast a longer-term deficit in the late-2020s, which would require higher incentive prices for new supply. However, there are currently some projects in development that may come online before a deficit forms or at prices below our long-term incentive price (Denison's Wheeler River, NexGen's Rook I, Global Atomic's Dasa), which could limit market prices in the meantime. Additionally, Kazatomprom has indicated a desire to maintain market share as demand grows, which could indicate production above our current forecasts. We also note that state-entities (China, Russia) could invest in uranium production that may not be economic, but meet strategic aims.
- **Delays in China's nuclear build-out and/or moves to increase self-sufficiency:** China is the most important driver for nuclear capacity and uranium demand over the next 15 years. The country has stated ambitious targets for nuclear generating capacity, but has historically had difficulties meeting their stated targets. With the introduction of new domestic reactors and a focus on de-carbonization, we think the country will make every effort to build out nuclear generating capacity, but there is a risk that the country falls short of stated targets as nuclear builds are expensive, complex, and time-consuming. We also note that China has made a drive towards self-sufficiency in the nuclear fuel chain by making investments in production, inventory, and enrichment. Given the increasing geopolitical tensions between China and Western countries, there is a possibility that China may continue to focus on self-sufficiency through investments in uranium production that may not be considered economic, but are in strategically friendly jurisdictions (similar to the investments in Husab and Rossing in Namibia).
- **Adoption of advanced reactors that require less uranium:** Many countries and companies are investing in the development of advanced Generation IV reactor technology, which includes designs that may use significantly less uranium. There are many designs being developed globally, some examples include – fast reactors from China (CFR-600), Russia (Brest-OD-300, BN-600 and BN-1200), and TerraPower; high-temperature reactors from China (HTR-PM) and X-Energy (Xe-100); and molten salt reactors from Canada (Moltex Energy). If these advanced reactors are adopted to replace current technology, uranium demand could be impacted.
- **More efficient use of uranium in nuclear fuel:** Nuclear technology has continued to improve, with increased efficiency over time. Nuclear fuel is now typically enriched to 4-5%, up from 3-4% historically, which has allowed for higher fuel burn-ups and more efficient use of uranium. The nuclear fuel industry is currently working on introducing slightly higher enriched fuel (5-6%), which could allow for even higher burn-ups and more efficient use of uranium.

RBC Capital Markets

RBC Elements™

Driving insights through data

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- Feature selection techniques to find what matters most in the data.
- Statistical modeling and analysis, and statistical tests such as distributions, and regression/GLM.
- Developing hypotheses and making inferences using large amounts of data.

Companies mentioned

Cameco Corporation (TSX: CCO CN; C$24.06; Underperform)
NexGen Energy Ltd. (TSX: NXE CN; C$5.24; Sector Perform; Speculative Risk)

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			Investment Banking Serv./Past 12 Mos.	
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HOLD [Sector Perform]	559	40.68	179	32.02
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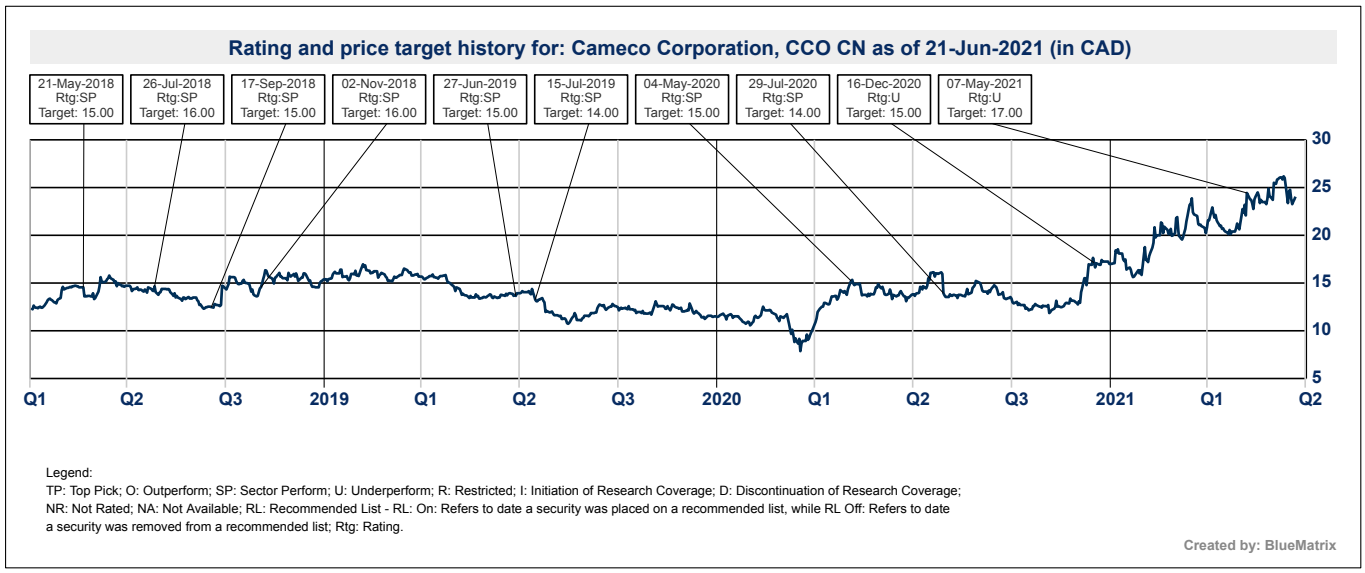

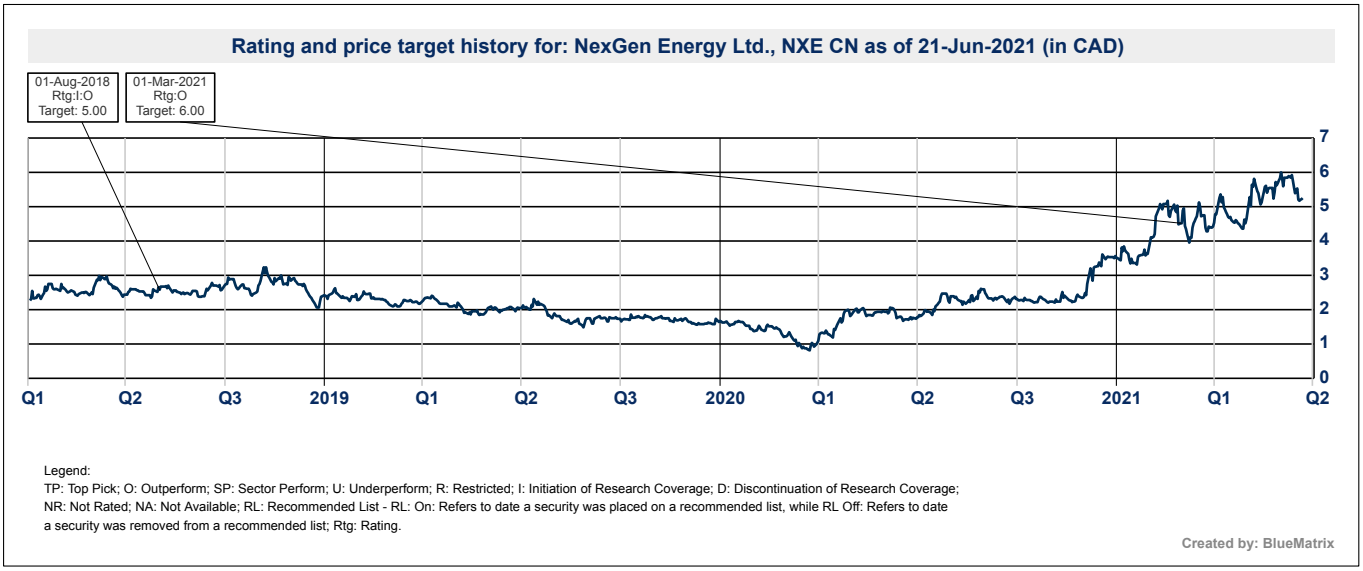

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Cameco Corporation

Valuation

We value the company by applying an EV/EBITDA multiple to Cameco's operating assets, a DCF valuation to its McArthur River asset, and then adding the CRA restricted cash. Our EV/EBITDA valuation applies a 15x multiple to 2022 EBITDA estimates — this multiple is above the average multiple post-Fukushima and pre-McArthur shutdown in recognition of greater interest as an ESG and clean energy investment. Our DCF analysis uses an 8% discount rate. The implied return to our $17 price target supports our Underperform rating.

Risks to rating and price target

We highlight several key risks and sensitivities that could be potentially material to our thesis on Cameco including: 1) an earlier outcome in the CRA transfer pricing dispute that results in the release of $300M restricted cash held by the government; 2) stronger-than-expected uranium prices; 3) uranium production disruptions from other producers; 4) an increase in valuation multiples due to rising interest as an ESG/clean energy investment; and 5) currency volatility, primarily CAD/USD.

NexGen Energy Ltd.

Valuation

We rate NexGen shares Sector Perform, Speculative Risk with a $6 price target. We value NexGen based on a NAV analysis using an 8% discount and 0.8x P/NAV multiple. The discount rate is in line with the rate used to evaluate other developing mine projects. The P/NAV multiple reflects a typical multiple assigned to a development-stage company that is not expected to start production until the mid-to-late 2020s while dealing with uncertainties in the interim related to regulatory approvals, construction delays, potential technical risks, and financing. We assign a Speculative Risk qualifier for the same reasons that influence the P/NAV multiple we use in our valuation. Our price target supports a Sector Perform rating.

Risks to rating and price target

1) Permitting delays, especially with respect to uranium mine development due to heightened sensitivities and concerns regarding nuclear material and radiation. 2) Technical challenges and construction delays, given the limited uranium mine development in the Western Athabasca region and lack of infrastructure. 3) Financing risk, as a pre-production company with debt and developing a uranium mine while market conditions remain challenging. 4) Uranium price, which has a significant impact on valuation. 5) CAD/USD exchange rate, as operations are located in Canada while uranium sales are primarily in USD.

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